

NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



THESIS

19980514 073

FIRST TERM ATTRITION OF FUNDAMENTAL APPLIED SKILLS TRAINING (FAST) STUDENTS

by

Jeffrey W. Hickox

March 1998

Thesis Advisor:

Samuel E. Buttrey

Approved for public release; distribution is unlimited.

REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE March 1998	3. REPORT TYPE AND DATES COVERED Master's Thesis
----------------------------------	------------------------------	---

4. TITLE AND SUBTITLE FIRST TERM ATTRITION OF FUNDAMENTAL APPLIED SKILLS TRAINING (FAST) STUDENTS	5. FUNDING NUMBERS
--	--------------------

6. AUTHOR(S) Hickox, Jeffrey, W.

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey CA 93943-5000

8. PERFORMING ORGANIZATION REPORT NUMBER
--

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
--

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE

13. ABSTRACT (maximum 200 words)

Fundamental Applied Skills Training (FAST) provides assistance to recruits with literacy skills deficiencies that could prevent them from successfully completing the recruit training cycle at Recruit Training Command, Great Lakes, Illinois. The program is successful in the short term, but the long-term effects of this training are not known. In response to a Navy Training Requirements Review action item, this thesis examined the first-term attrition of FAST students from fiscal years 1993 and 1994 at yearly intervals. Analysis determined that FAST students have a significantly lower attrition rate throughout the first term and a significantly higher reenlistment rate for a second term than sailors of similar abilities. Attrition of FAST students was similar to that of sailors of the upper mental group during the first term. The thesis includes a general overview of FAST research and a concise history of FAST development.

14. SUBJECT TERMS FAST, Attrition, Naval Training, Naval Personnel, Skills

15. NUMBER OF PAGES 81

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT Unclassified

18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified
--

19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified

20. LIMITATION OF ABSTRACT UL

Approved for public release; distribution is unlimited.

**FIRST TERM ATTRITION OF FUNDAMENTAL APPLIED SKILLS
TRAINING (FAST) STUDENTS**

Jeffrey W. Hickox
Lieutenant, United States Navy
B.S., United States Naval Academy, 1990

Submitted in partial fulfillment
of the requirements for the degree of

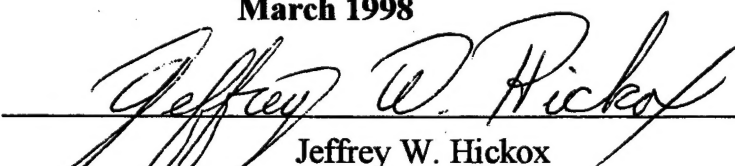
MASTER OF SCIENCE IN OPERATIONS RESEARCH

from the


NAVAL POSTGRADUATE SCHOOL

March 1998

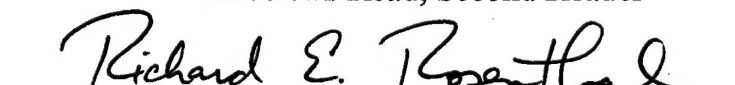
Author:


Jeffrey W. Hickox

Approved by:


Samuel E. Buttrey, Thesis Advisor


Robert R. Read, Second Reader


Richard E. Rosenthal, Chairman
Department of Operations Research

ABSTRACT

Fundamental Applied Skills Training (FAST) provides assistance to recruits with literacy skills deficiencies that could prevent them from successfully completing the recruit training cycle at Recruit Training Command, Great Lakes, Illinois. The program is successful in the short term, but the long-term effects of this training are not known. In response to a Navy Training Requirements Review action item, this thesis examined the first-term attrition of FAST students from fiscal years 1993 and 1994 at yearly intervals. Analysis determined that FAST students have a significantly lower attrition rate throughout the first term and a significantly higher reenlistment rate for a second term than sailors of similar abilities. Attrition of FAST students was similar to that of sailors of the upper mental group during the first term. The thesis includes a general overview of FAST research and a concise history of FAST development.

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	BACKGROUND.....	1
B.	OBJECTIVES AND RESEARCH QUESTIONS.....	2
C.	METHODOLOGY.....	3
D.	ORGANIZATION OF STUDY.....	4
II.	LITERATURE REVIEW.....	5
A.	CURRENT FAST PROGRAM.....	5
B.	LITERATURE REVIEW.....	7
C.	CURRENT ISSUES.....	15
III.	METHODOLOGY.....	17
A.	DATA SET.....	17
B.	MISSING DATA.....	22
C.	STATISTICAL METHODOLOGY.....	24
IV.	DATA ANALYSIS.....	27
A.	ATTRITION CALCULATIONS.....	27
B.	DISCUSSION.....	29
V.	CONCLUSIONS AND RECOMMENDATIONS.....	33
A.	CONCLUSIONS.....	33
B.	RECOMMENDATIONS FOR FURTHER STUDY.....	33

APPENDIX A.	FAST HISTORY	35
APPENDIX B.	RAW PROMOTION DATA.	45
APPENDIX C.	RAW DATA TABLES	49
LIST OF REFERENCES.	55
INITIAL DISTRIBUTION LIST.	61

LIST OF TABLES

1.	Recruit Desirability Based on ASVAB Scores and High School Graduation.	18
2.	FY 93 FAST Loading	21
3.	FY 94 FAST Loading	22
4.	Missing FY 93 FAST Data	23
5.	Missing FY 94 FAST Data	24
6.	Contract Length for FY 93 Cohort	25
7.	FAST Mental Group Distribution.	26
8.	FY 93 Cohort Cumulative Attrition	28
9.	FY 94 Cohort Cumulative Attrition	28
10.	FY 93 Percent Attrition by Year.	28
11.	FY 94 Percent Attrition by Year.	29
12.	FY 93 P-values.	30
13.	FY 94 P-values.	30
14.	FY 93 Promotion Data.	46
15.	FY 94 Promotion Data.	47
16.	FY 93 Attrition Data	50
17.	FY 93 Contract Data	51
18.	FY 93 Mental Group Data	52
19.	FY 94 Attrition Data	53
20.	FY 94 Mental Group Data	54

LIST OF ACRONYMS AND ABBREVIATIONS

AFQT	Armed Forces Qualification Test
ALCPT	American Language Course Placement Test
ARI	Arithmetic Reasoning test
ART	Academic Remedial Training
ASMO	Assignment Memorandum Office
ASVAB	Armed Services Vocational Aptitude Battery
BMR	<u>Basic Military Requirements</u>
BTB	Basic Test Battery
BUPERS	Bureau of Naval Personnel
CCA	Curriculum Control Authority
CCMM	Course Curriculum Model Manager
CDP	Course Data Processing
CIN	Course Identification Number
CLIN	Contract Line Item Number
CNET	Chief of Naval Education and Training
CNO	Chief of Naval Operations
CNTT	Chief of Naval Technical Training
CO	Commanding Officer
CRES	Computer Readability Editing System
DMDC	Defense Manpower Data Center

DOD	Department of Defense
DSCAC	DMDC Special Cohort Accession and Continuer file
ECL	English Comprehension Level
EMF	Enlisted Master File
FAST	Fundamental Applied Skills Training
FY	Fiscal Year
GAO	General Accounting Office
GCT	General Classification Test
HumRRO	Human Resources Research Organization
ISC	Interservice Separation Code
JOBS	Job Oriented Basic Skills
MECH	Mechanical test
NEC	Navy Enlisted Classification Code
NITRAS II	Navy Integrated Training Resources and Administration System II
NPRDC	Navy Personnel Research and Development Center
NRCC	Non-Resident Career Course
NRS	Navy Reading Skills
NTC	Navy Training Command
NTRR	Navy Training Requirements Review
PC	Paragraph Comprehension
PREST	Performance-Related Enabling Skills Training
RGL	Reading Grade Level

RTC	Recruit Training Command
RTM	Rate Training Manual
SDCCD	San Diego Community College District
SDRT	Stanford Diagnostic Reading Test
SECNAV	Secretary of the Navy
SPD	Separation Program Designator
SS	Study Skills
SSC	Service School Command
SSN	Social Security Number
TAEG	Training Analysis and Evaluation Group
Unk	Unknown
VE	Verbal Expression
VS	Verbal Skills
WK	Word Knowledge

ACKNOWLEDGEMENT

First, the author would like to acknowledge the financial support of CNET for funding the cost of the experience tour to Recruit Training Command, Great Lakes, Illinois. This work was performed under job order RFW97, tango number 001G2-499G2, and document number N6804597WRFF281.

Second, the author wants to thank Professor Samuel E. Buttrey for his guidance during this thesis.

Third, the author wants to thank the following individuals for their assistance: Mr. Carl Ross, LCDR Fletcher, LCDR Klenzman, LT Kirsche, LT Fink, DCCM Davis, AZ1 Wirtz, PN1 Tenaza-Fischer, CTIC Hagert and the FAST military staff, and Ms. June Ross and the FAST civilian staff, all at Great Lakes, Ms. Emily Webb at CNET, Mr. Robert Hamilton at DMDC West, and Mr. Dennis Mar and Ms. Debbi Kreider at Naval Postgraduate School.

Finally, the author wants to thank his wife, Tashera and his daughter, McKenna for their support and encouragement throughout this process.

EXECUTIVE SUMMARY

The Fundamental Applied Skills Training (FAST) program at Recruit Training Command, Great Lakes, Illinois, is a remedial literacy skills program designed to assist recruits in completing the eight-week recruit training cycle. Recent research found that all FAST graduates completed the recruit training cycle over a five year period. This is not surprising because a moratorium on academic attrition has existed since 1989. A better measure of FAST program success would be the performance of its students during their first term of service. Unfortunately, a Navy Training Requirements Review action item found that no mechanism was available to track FAST student performance during their first enlistment. This thesis examines the first-term attrition and reenlistment rates of FAST students from fiscal years 1993 and 1994 at yearly intervals in order to answer the action item.

FAST is comprised of three unique programs. Civilians teach verbal skills and Navy reading skills, and military instructors teach study skills. Students can remain in this remedial training for up to six weeks before returning to the normal recruit training path. All students who start a program are entered into the Navy Integrated Training Resources and Administration System II database. The Social Security Numbers of these students were matched to personnel data in the Defense Manpower Data Center Special Cohort Accession and Continuer file to obtain the attrition data.

Ninety percent of FAST students are from the "lower mental group" as defined by the military. The lower mental group served as the control group for the survey. Analysis

determined that FAST students have a significantly lower attrition rate throughout the first term and a significantly higher reenlistment rate for a second term than sailors of similar abilities.

FAST students were also compared to sailors of the "upper mental group" using a similar methodology. Attrition of FAST students was similar to those sailors during the first term.

FAST was known to be effective in the short term in that participants in the program graduated from basic training. This analysis concludes that FAST is also effective throughout the first enlisted term. Participation in the program should be maximized to gain the benefits of lower attrition during the first term and higher retention for a second term.

I. INTRODUCTION

A. BACKGROUND

The Fundamental Applied Skills Training (FAST) program at Recruit Training Command (RTC), Great Lakes, Illinois, is a remedial literacy skills program designed to assist recruits in completing the eight-week recruit training cycle. Recent research found that all FAST graduates completed the recruit training cycle over a five year period. This is not surprising because a moratorium on academic attrition has existed since 1989. A better measure of FAST program success would be the performance of its students during their first term of service. Unfortunately, a Navy Training Requirements Review (NTRR) action item found that no mechanism was available to track FAST student performance during their first enlistment. This thesis examines the first-term attrition and reenlistment rates of FAST students from fiscal years 1993 and 1994.

For all enlisted personnel, the Navy adventure begins at RTC, Great Lakes, Illinois. The RTC mission statement is:

Recruit Training Command transforms recruit trainees into enlisted apprentice sailors in support of fleet requirements. Through screening, outfitting, education/training and fostering attitudinal development, we prepare graduates for follow-on training. (RTC Mission Statement, 1996)

Meeting this mission achieves the vision of RTC to graduate sailors who are "...fully capable and eager to meet the challenges of the 21st century Navy." (RTC Vision Statement, 1996)

The FAST program exists to help attain these goals. The objective of FAST is "...to assist recruits whose literacy skills deficiencies could impede their progress or preclude their successful completion of the recruit training cycle."

(NAVCRUITCOMGLAKESINST 1540.8B, 02 Dec 1992, p. 1) The graduation rate for FAST-educated recruits was 100 percent over a period of five years (Spendley, Dec 1990, p. 5). Using this measure of effectiveness, FAST achieves its stated objective.

In 1996, a NTRR action item chit found that, "No tracking mechanism is available to measure FAST student performance through their first enlistment." (NTRR, 26 Feb 1996, #2136) The working group recommendation was to use the Enlisted Master File (EMF) to flag FAST students. An update in June said that the EMF was an inappropriate tracking mechanism since it is a personnel file and not a training file. The new recommendation was to use the Navy Integrated Training Resources and Administration System II (NITRAS II). (NTRR, 14 Jun 1996, #2136)

NITRAS II is "...the Navy's principal authoritative source of training information for the elements which comprise its database." (CNETINST 1510.1F, 15 Apr 1997, p. 3) It can track Navy personnel performance at training commands, but it cannot track performance of personnel during their operational assignments.

B. OBJECTIVES AND RESEARCH QUESTIONS

The primary objective of this thesis is to answer the NTRR problem of measuring FAST student performance through their first enlistment. This thesis will look at FAST student retention rates during the first four years of enlistment. The following two research questions will be answered:

1. Do participants in the FAST program attrite from the Navy at a different rate than the rest of the Navy?
2. Do participants in the FAST program attrite from the Navy at a different rate than a similar non-participatory cohort of recruits?

The first research question was requested by the staffs at both RTC and the Navy Training Command (NTC), Great Lakes, Illinois to figure out the overall difference. The second research question allows for a better comparison between recruits of similar abilities.

C. METHODOLOGY

Raw data on FAST participants in Fiscal Year (FY) 1993 and 1994 was obtained from the NITRAS II system by Course Data Processing (CDP) number. The Social Security Numbers (SSN) were cross-referenced to the Defense Manpower Data Center (DMDC) Special Cohort Accession and Continuer (DSCAC) file. DSCAC data elements include SSN, Armed Forces Qualification Test (AFQT) form, version, percentile and mental group, Verbal Expression (VE) raw score, rank, education, date enlisted, date separated, Separation Program Designator (SPD), Interservice Separation Code (ISC), character of service, and reenlistment eligibility. The DSCAC database was split into the FAST group, the control group, and the rest of the population. All sailors with a SPD had their length of service computed by subtracting the enlistment date from the separation date. If the length of service was less than the contract length, the sailor was counted as an attrite from the Navy in each successive year until the end of the original contract. Attrition rates were computed at yearly intervals and were compared by group using a two sample standard normal test for proportions (Larsen, 1986, pp.378-380).

D. ORGANIZATION OF STUDY

The next chapter provides a history and literature review of the FAST program. The third chapter discusses the methodology used to select the control group and to determine FAST student effectiveness during their first term. In Chapter IV, the data is analyzed. The final chapter provides conclusions and recommendations of the study.

II. LITERATURE REVIEW

A. CURRENT FAST PROGRAM

FAST is a Chief of Naval Operations (CNO) sponsored course with the Chief of Naval Education and Training (CNET) acting as the Curriculum Control Authority (CCA). The requirement for all recruits to read, speak and understand the English language is found in COMNAVCRUITCOMINST 1130.8D, Chapter 29, on page 1-I-32 in section 1-I-7 C.4. All recruits with a VE score of 42 or below on the Armed Services Vocational Aptitude Battery (ASVAB) obtain FAST remedial training. Recruits with scores between 43 and 46 participate if space is available. Recruits who are foreign-born or for whom English is a second language are screened for the three-week Verbal Skills (VS) curriculum. If they pass the comprehensive test at the end of the course, they take the one-week Study Skills (SS) course. If they fail the comprehensive test, they take the one-week reading comprehension segment of the Navy Reading Skills (NRS) course before taking the SS course. Recruits that do not screen for the VS course take the two-week NRS course. If they fail the comprehensive, they retake the course before proceeding to SS. Recruits enter the SS course the first time they fail the same examination twice during boot camp. Finally, no recruit can remain in FAST for more than six weeks.

VS consists of three, one-week phases in Navy vocabulary, grammatical structures, and language fluency. NRS consists of three phases. One week is dedicated to

vocabulary development and graphic aids while the second week is dedicated to reading comprehension. SS consists of one week of training emphasizing study habits needed to improve test-taking habits.

The civilian staff comprises one associate dean, one lead instructor, and seven instructors who teach the VS and NRS courses. Civilian instructors must have a baccalaureate degree in an adult education area and must have at least three years experience in teaching adults. About half of the instructors have a master's degree. An average instructor has over ten years of teaching adult education and almost twenty years of teaching experience. The military instructional staff comprises two E-7 and two E-6 instructors who teach the SS course and two E-7 and seven E-6 supervisory staff who oversee the FAST recruits and their berthing area. Military instructional staff must have a baccalaureate degree and usually have Naval Enlisted Classification Code (NEC) 9502.

The FY 1997 contract with San Diego Community College District (SDCCD) called for 100 NRS and 32 VS classes. The maximum class size was twenty for NRS and was fifteen for VS. This resulted in a maximum capacity of 2500 students per year. Estimates are that approximately 1500 students complete the program each year. Military instructors taught the SS class with a maximum class size of twenty.

The FY 1997 costs were \$8,152 per month for VS and \$20,380 per month for NRS. This results in a total cost of \$342,384 per year. This was from Contract Line Item Number (CLIN) 0001 in the \$3,791,532 Job Oriented Basic Skills (JOBS) contract maintained by Service School Command (SSC) at NTC, Great Lakes. (Navy Contract N00612-95-C-9011, 1 Apr 95)

B. LITERATURE REVIEW

A study by Hoiberg in 1973 at the Academic Remedial Training (ART) Division, San Diego looked at 1518 male recruits who participated in the ART program from 1967-1972. Of the ART students, 1208 graduated. A control group of 1520 was used for comparison. The goals were to identify characteristics predictive of ART graduation, explore variables that distinguish ART recruits from other recruits, and examine selection changes for ART over the period. Predictive characteristics of ART graduation were higher initial reading grade levels, ages between 18 and 22, higher arithmetic reasoning (ARI) test scores, lower recruit temperament survey scores, and the recruit's belief that he was not mentally ill. ART non-graduates were found to have difficulties in most endeavors, implying that personal problems, inability to adjust, and mental capacity may have affected their success. Some gradual changes in ART selection occurred as the quality of recruits improved over the study's time period. (Hoiberg, Jul 73)

Hoiberg conducted a follow-up study on this sample in August, 1973. The purpose of the new study was to find characteristics that related to reading improvement and evaluate the effectiveness of the program. The criterion was the difference between final and initial Reading Grade Levels (RGL). Of the 1518 recruits, 1323 had their initial and final RGL's recorded. Of those 1323 men, 1204 improved their RGL based on Gates-MacGinite testing. Higher AFQT scores, higher ARI scores, higher General Classification Test (GCT) scores, younger recruits, and stating that one had tried to commit suicide were related to higher reading improvement levels. These results supported previous

findings on the relationship between intelligence and reading improvement. The gains in RGL suggested that the ART program is effective for poor readers. (Hoiberg, Aug 73)

Hoiberg then applied the same data set to conduct research similar to the Hunt and Wittson study twenty years earlier. The purpose was to find the number of first-year discharges for neuropsychiatric and disciplinary reasons for ART students and for the control group. The goal was to compare these results to those obtained by Hunt and Wittson. For the ART group, 273 out of 1518 men were discharged for neuropsychiatric and disciplinary reasons during their first year of active duty. Only 26 of the 1520 men in the control group were discharged in their first year for similar reasons. Like the study twenty years earlier, this study found first-year attrition of ART students to be four times higher than the control group. (Hoiberg, Oct 74)

Hoiberg next looked at the rate of effectiveness of men assigned to ART. A recommendation for re-enlistment or remaining on active duty constituted the criterion for effectiveness. This standard resulted in 53.5 percent of the ART sample being effective, while 62.3 percent of the controls were effective. Higher RGL, AFQT scores, and years of education were characteristics of effective recruits, with higher RGL being the most important predictor of success. This confirmed the belief that there is a strong relationship between reading ability and success in the military. The control group also achieved higher promotion rates. The most significant distinction between the remedial readers and the controls was the number of unsuitability discharges due to inaptitude. A possible explanation for the higher number of these discharges for ART recruits was that many of the recruits in ART were also part of the "Project 100,000" experiment. (Hoiberg, Sep 74)

In 1976, Biersner conducted a study to find tests and measures to identify characteristics of recruits who needed remedial education. The results were that higher GCT, ARI, and Mechanical (MECH) test scores are associated with better reading performance. Another finding was that education may measure conformity to social standards and norms. The small sample size of 87, with 53 in the control group, makes these conclusions tenuous. The number of significant correlations is near the expected chance frequency. (Biersner, Apr 76)

The Reading Ability Assessment Project was a study done at RTC San Diego from May through August 1974. All recruits took the Gates-MacGinite reading test on arrival at RTC. The sample size was 7138. Study findings included the features that reading ability does not differ significantly between high school graduates and non-graduates and that recruits for which English is a second language have a lower RGL. Two conclusions were that one in four recruits have reading abilities at least five RGL's below that of the technical manuals they will use, and that this problem exists primarily for AFQT mental category III, AFQT mental category IV, and English as a second language recruits. The most likely explanation for this gap is that poor reading skills are a common problem in the civilian education schools that provide the primary source of Navy manpower. (Zierdt, Apr 76)

The Powers study found several sources that emphasized that education did not necessarily correlate closely to reading skills and that most Rate Training Manuals (RTM) and Non-Resident Career Courses (NRCC) were written at the thirteenth RGL. Training manuals for seamen and firemen had a RGL of 10.2, the Basic Military Requirements

(BMR) had a RGL of 10.85, and The Bluejackets' Manual had a RGL of 11.5. The median RGL of the recruit population was 10.8. The conclusion was that about half of the recruits may not be able to read these manuals, and that not knowing their content would preclude their advancement in rank. (Powers, Jul 77)

The main finding in Halter's thesis was that high school graduates are less likely to attrite before the completion of their initial obligation than non-high school graduates. He also asserted that predictions concerning literacy can only be speculations based on current trend data. He found the importance of reading in the technical Navy is critical since over 70 million document pages exist. As a result, recruits with lower RGL's attrite at higher rates than the recruits who are better readers. (Halter, Dec 79)

Biersner conducted a second study in 1980 using the same sample of eighty-seven recruits from his first study. The main conclusion was that low intelligence and cultural factors may account for lower reading performance in Navy recruits. The analysis found that RGL changes for non-Caucasians improved significantly when compared to the RGL changes for Caucasians in the same remedial group. (Biersner, Feb 80)

The first computer-assisted literacy instruction took place in 1980 at RTC San Diego. The purpose was to examine the feasibility of remedial education using computers and to compare this instruction to the current ART program. Two groups of twenty-four native English speakers were used, with one group receiving the traditional first week of the program and the second group using the computer. The groups then completed the final three weeks of the program together. The computer students did as well as the control group. Due to cost, the recommendation was to use teachers until computers

became cheaper. After computers become affordable, the final recommendation was a division of labor between computers and teachers. (Wisher, Apr 80)

Project PREST (Performance-related Enabling Skills Training) built on the 1980 computer study at San Diego. The purpose was the same as the San Diego study, but the computer system and the location were different. The sample was 152 native English speaking recruits at RTC Orlando with 77 in the experimental group and 75 in the control group. Like the study the previous year, it came to the conclusion that computers were cost-prohibitive in the short term, but should be added in the future. (Wisher, May 81)

The two previous studies did not look at recruits who used English as a second language. A study looking at this group was done in 1982. The purpose was to assess English language comprehension skills of recruits at all RTC's to identify recruits deficient in verbal English skills. A sample of 3058 was given the English Comprehension Level (ECL) exam the day after they took the Gates-MacGinitie test. This analysis supported the need for the development and implementation of a new VS curriculum for recruits who need verbal language remediation. (Brown, Mar 82)

Studies also were being done that looked at RGL and performance after recruit training. A study of 5797 students in 46 Navy technical "A" schools tried to find the extent to which literacy gaps hinder performance. Three interesting results were that study skills and reading ability were equally potent training variables, that reading skill was not a good predictor of hands-on performance, and that students who read poorly tend to read very little. Consequently, students seek out alternate sources of information to learn

material as textbooks become less comprehensible. Finally, fleet-experienced students of lower RGL's did as well or better than students with higher RGL's and no experience.

(Sander, Aug 82)

The purpose of the next study was to determine RGL's of essential Navy job reading materials using the Department of Defense (DOD) military specification MIL-M-38784A, Amendment 6. This standard uses the Computer Readability Editing System (CRES). Of the 76 items sampled, the average RGL was the tenth grade. As a result, OPNAVINST 1510.11, Enlisted Fundamental Skills Training, raised the minimum RGL goal from the sixth grade to the ninth grade. (Hamel, Oct 82)

Bilingual recruits were the subject of the following research study. The purpose was to decide if a relationship existed between native language ability and English trainability. Using a sample of 38 Hispanic recruits from all three RTC's, the researcher found a mild correlation between initial Spanish reading proficiency and gains in English language proficiency. These results did not justify giving a Spanish pre-test to all Hispanic recruits to see if they would be successful in the ART program. (Angus, 1986, p. 25)

The Human Resources Research Organization (HumRRO) report of 1988 used 20,422 recruits to correlate the Gates-MacGinitie, Nelson-Denny, Test of Adult Basic Education, Adult Basic Learning Examination, Stanford Tests of Academic Skills, and the Air Force Reading Abilities Test to five ASVAB composites to generate an ASVAB to RGL conversion table. The ASVAB VE was selected as the best anchor test score. The study also concluded that different reading tests yield very different estimates of an individual's reading ability, that the median RGL of military applicants is 10.9, and that

reading ability is necessary, but not sufficient, to perform well on the ASVAB. The strong relationship found between reading ability, training success, and military performance was consistent with previous research. (Barnes, Oct 88) This report has an excellent bibliography on related work in the field of remedial reading education.

A post-boot camp FAST pilot program was conducted at RTC San Diego in October of 1989. The recommendation was that FAST should be completed before boot camp commenced because graduated recruits rated liberty which detracted from their studies, and non-English speaking recruits could fail basic training before they reached FAST. (Commanding Officer (CO), RTC San Diego, 30 Jan 90)

The objectives of the Thompson and Ethridge report in May 1990 were to assess success of ART trainees in the initial training pipeline and determine if the current ART curriculum was successful. A sample of 388 recruits was used in the study. The study assumed that assignment to "A" School and promotion to petty officer during the first enlistment were necessary elements for ART success. Using this criterion for success, the study concluded that the effectiveness of ART was questionable because over half the sample separated from the Navy before completing the training pipeline. (Ethridge, May 90)

The first master's thesis to look at FAST was in December 1990. The measure of effectiveness used in the evaluation was the boot camp graduation rate for FAST recruits. Due to the moratorium on academic attrition instituted in 1989, the researcher found the graduation rate to be 100 percent. The interesting finding of the study was that FAST

recruits were 2.4 times more likely to be promoted to E-4 within three years than their controls who did not participate in the FAST program. (Spendley, Dec 90)

FAST was the subject of a second master's thesis in adult education in December 1994. The goal was to evaluate the effectiveness of the FAST program. Findings included that FAST was not linked to other programs as a performance improvement strategy and that graduation of FAST students from RTC and "A" school both exceed 90 percent. Like other researchers, this study concluded that no established tracking system existed to assess follow on performance of students. (Belanger, Dec 94)

The Center for Naval Analyses evaluated the success of FAST from 1989 to 1992 using metrics besides boot camp attrition. Results of the analysis were that students who graduated from FAST appeared to have a higher probability of completing their first tours. (Golfin, Mar 95)

A related Center for Naval Analyses study investigated the differences between promotion opportunities for enlisted personnel. They found that higher AFQT scores, earning a high school diploma, marriage, and having a guaranteed "A" school were factors that contributed to higher retention and promotion rates. (Golfin, Aug 95)

The most recent master's thesis looking at FAST was completed in March 1996. The principal goal of the thesis was to learn if FAST completion was related to success in recruit training. Since the moratorium blocking academic attrition is still in place, the results were the same as the thesis completed in 1990. An interesting finding was that FAST attendees left the Navy at a lower rate than the control group after one year of service. (Thomlison, Mar 96)

A General Accounting Office (GAO) report is the most recent study related to the subject. It looked at first term attrition for all of the services at the six-month period. It found that 25,000 of the 176,000 recruits in fiscal year 1994 had attrited by the six-month point of their contracts. They determined that the DOD primary database could not be used to learn the reasons why these recruits had separated from the services. For the Navy, about 13 percent of all recruits attrite within six months and about 33 percent attrite before they fulfill their contract. (GAO, Jan 97)

C. CURRENT ISSUES

During FY 1996, the Navy launched the War on Attrition to combat attrition at every level of a sailor's career. The goal was to reduce attrition at all stages by five to ten percent while maintaining quality. (GAO, Jan 97, p. 19) DOD rules require that 90 percent of recruits be high school graduates and 60 percent score in the upper mental group of the ASVAB. An upper mental group score is an AFQT score of 50 or higher. (Navy Times, 17 Nov 97, p. 3) On average, the Navy spent \$6,767 recruiting each recruit in 1997 (Navy Times, 1 Dec 97, p. 6).

The Navy has a shortfall of about 7,000 of the 26,800 general detail sailors required in the fleet due to the drawdown personnel decision to fill skilled, technical billets first (Navy Times, 27 Oct 97, p. 3). The goal for first term retention is 38 percent, but only 30.8 percent of first termers re-enlisted in 1997 (Navy Times, 15 Dec 97, p. 13). Most of the FAST students are general detail sailors, and this is why their long term retention is of interest today.

III. METHODOLOGY

A. DATA SET

The NTRR identified the problem that no tracking mechanism was available for tracking FAST student performance during their first enlistment. The original solution to this problem was to flag FAST graduates in the enlisted master personnel file. This proposal was rejected as inappropriate because training issues should not be tracked in personnel files. (NTRR, 14 Jun 96, #2136)

NITRAS II is the Navy's principal authoritative source for training information. The reporting by student name and SSN is mandatory for all formal Navy training courses. (CNETINST 1510.1F, p. 3) This is better than the current system, but it still does not track FAST performance outside training commands and it does not access personnel loss data.

DMDC manages DOD's primary source of service-wide attrition data (GAO, Jan 97, p. 24). The DSCAC file tracks the active duty enlisted careers of all personnel by the FY in which they joined the service. DSCAC file updates are quarterly for the first five years. This file provided all of the personnel data needed through October 1, 1997.

FAST data for FY 1993 and 1994 was collected by the author in June 1997 at RTC, Great Lakes. NITRAS II does not contain any FAST data before 1993. NITRAS II also does not allow users to download SSN's to a file using the query function. Therefore, each report was printed out by CDP and FY, and the SSN's of FAST participants were entered manually into a spreadsheet.

DMDC transferred the DSCAC data to the mainframe computer at the Naval Postgraduate School. Data elements extracted and converted into ASCII text included SSN, AFQT percentile and mental group, term of enlistment, day of entry, day of discharge, rank at entry, rank at discharge, and SPD. This master file was broken into working files of 1000 records and imported into a spreadsheet. Data was separated into three groups: FAST participants, the lower mental group, and the upper mental group.

The AFQT scores are broken down into the mental groups shown in Table 1.

Table 1. Recruit Desirability Based on ASVAB Scores and High School Graduation

			Recruit Quality	
	AFQT Mental Group	AFQT Score	High School Graduate	Non-High School Graduate
Upper Mental Group	I	93-99	High	High
	II	65-92	High	High to Average
	III Upper	50-64	Average	Average
Lower Mental Group	III Lower	31-49	Average	Average to Low
	IV A	21-30	Low	Low
	IV B	16-20	Low	Low
	IV C	10-15	Low	Low
	V	1-9	Unqualified	Unqualified

After COMNAVCRUITCOMINST 1130.8D and Halter, Table 1-1.

Federal law prohibits Category V recruits from entering the military. By direction, high school graduates need a minimum AFQT score of 17, and non-high school graduates need a minimum AFQT score of 31. (COMNAVCRUITCOMINST 1130.8D, p. 1-III-5) The

Commander, Navy Recruiting Command, can raise the minimum requirements to meet CNO accession quality goals. The current minimum AFQT score for high school graduates is 27 (Navy Recruiting Command Policy-Gram #60-90, 5 Mar 90).

The Navy defines the lower mental group as those recruits with an AFQT score of 49 or below. Most FAST recruits are from the lower mental group. For comparison, the best control group is the lower mental group recruits who did not attend FAST from the same cohort year.

A comparison of the original records to the NITRAS II reports was conducted to verify the raw data. When San Diego and Orlando closed, only their teaching materials were forwarded to Great Lakes. As a result, only the Great Lakes FAST records for FY 1993 and 1994 were available to check the data.

For 1993, the local records stated that 1292 recruits participated in at least one FAST course (FY 93 FAST Input by Path, FAST ASMO-In Statistics Fiscal Year 93). Due to the small size, all VS records were checked. Fifteen percent of the NRS and SS records were selected at random for accuracy. Of 288 records checked, only seven SSN's did not match between FAST records and NITRAS II.

For 1994, records showed that 853 students completed FAST at Great Lakes (FAST Facts FY 94). All VS and SS records were checked because there were so few. Fifteen percent of the NRS records were also verified. Of 302 records, only three SSN's failed the cross-check from FAST to NITRAS II.

For both years, all recruits selected from the NITRAS II files appeared in the original FAST records. Two possible explanations for the ten students who appeared in

the FAST records but not in the NITRAS II files are that the SSN was recorded incorrectly at FAST and that the SSN was entered incorrectly into the NITRAS II system. It does appear that all students who are entered into the NITRAS II files did attend at least one FAST course.

The next step involved classifying all the recruits. Most recruits took only one FAST course. Passing the course resulted in a graduation entry in the NITRAS II system. Failing the course resulted in either a graduation, academic failure entry or a disenrolled, administrative incomplete training entry.

Some recruits were assigned to multiple courses. Others failed and had to retake a course. To avoid counting a recruit multiple times in this study, two rules were used to classify recruits using the class convening dates. First, if a student passed any course, that recruit was counted in the graduation category of the course passed. For those students who passed multiple courses, that recruit was counted in the first course passed. Second, if a student failed multiple courses, that recruit was counted in the disenrolled category for the first course failed. The results are summarized in Tables 2 and 3.

For FY 1993, FAST Great Lakes records stated 1292 recruits started the program. The NITRAS II files, after corrections, had 1277 recruits starting FAST that year. This compared well with the check data.

For FY 1994, FAST Great Lakes changed their records. They stated that 853 recruits completed the program. Correcting for this change, it was found that 893 recruits started the program. The corrected NITRAS II files had 890 recruits starting FAST that year. This also compared well to the check data.

Table 2. FY 93 FAST Loading

RTC	FAST Course	Graduated/ Disenrolled	NITRAS II Total	Multiple Entries	Actual Total
Great Lakes	NRS	Graduated	410	7	403
		Disenrolled	96	16	80
	SS	Graduated	599	0	599
		Disenrolled	125	12	113
	VS	Graduated	71	0	71
		Disenrolled	15	4	11
Orlando	NRS	Graduated	1262	2	1260
		Disenrolled	167	30	137
	SS	Graduated	7	1	6
		Disenrolled	0	0	0
	VS	Graduated	17	0	17
		Disenrolled	2	2	0
San Diego	NRS	Graduated	506	4	502
		Disenrolled	50	28	22
	SS	Graduated	48	5	43
		Disenrolled	1	1	0
	VS	Graduated	56	1	55
		Disenrolled	6	2	4

After NITRAS II Multi Class Student Data FY 1993

The final step needed was to separate the DSCAC data into the three groups for analysis. The FAST students were matched by SSN and separated into files based on CDP and whether they graduated from the course. The remaining personnel were sorted by AFQT scores into the lower mental control group and the upper mental group.

Table 3. FY 94 FAST Loading

RTC	FAST Course	Graduated/ Disenrolled	NITRAS II Total	Multiple Entries	Actual Total
Great Lakes	NRS	Graduated	644	2	642
		Disenrolled	58	6	52
	SS	Graduated	28	0	28
		Disenrolled	6	2	4
	VS	Graduated	155	1	154
		Disenrolled	13	3	10
Orlando	NRS	Graduated	526	3	523
		Disenrolled	173	17	156
	SS	Graduated	0	0	0
		Disenrolled	0	0	0
	VS	Graduated	9	0	9
		Disenrolled	2	2	0

After NITRAS II Multi Class Student Data FY 1994

B. MISSING DATA

The two data sets did not completely match up when they were merged. Only 93.4 percent of the FY 93 and 87.0 percent of the FY 94 FAST NITRAS II SSN's had matches in the DSCAC files. Two reasons for this data loss are that some recruits are in a different FY cohort than the NITRAS II data, and some SSN's were lost during the data transfer of the DSCAC files. The lost data by FY is shown in Tables 4 and 5.

Table 4. Missing FY 93 FAST Data

RTC	FAST Course	Graduated/ Disenrolled	Actual Total	Missing Entries	Total Used in Analysis
Great Lakes	NRS	Graduated	403	29	374
		Disenrolled	80	4	76
	SS	Graduated	599	41	558
		Disenrolled	113	5	108
	VS	Graduated	71	3	68
		Disenrolled	11	2	9
Orlando	NRS	Graduated	1260	70	1190
		Disenrolled	137	15	122
	SS	Graduated	6	0	6
		Disenrolled	0	0	0
	VS	Graduated	17	5	12
		Disenrolled	0	0	0
San Diego	NRS	Graduated	502	42	460
		Disenrolled	22	0	22
	SS	Graduated	43	3	40
		Disenrolled	0	0	0
	VS	Graduated	55	2	53
		Disenrolled	4	0	4

Source: DSCAC FY 93 Cohort File and NITRAS II Multi Class Student Data FY 93

Table 5. Missing FY 94 FAST Data

RTC	FAST Course	Graduated/ Disenrolled	Actual Total	Missing Entries	Total Used in Analysis
Great Lakes	NRS	Graduated	642	90	552
		Disenrolled	52	5	47
	SS	Graduated	28	7	21
		Disenrolled	4	0	4
	VS	Graduated	154	18	136
		Disenrolled	10	1	9
Orlando	NRS	Graduated	523	62	461
		Disenrolled	156	20	136
	SS	Graduated	0	0	0
		Disenrolled	0	0	0
	VS	Graduated	9	2	7
		Disenrolled	0	0	0

Source: DSCAC FY 94 Cohort File and NITRAS II Multi Class Student Data FY 94

C. STATISTICAL METHODOLOGY

The objective is to look at attrition during the first term at yearly intervals. One-, two-, three-, four-, five-, six- and eight-year recruiting contracts were available for initial enlistments during this period. Recruits who met their contractual obligations and decided to leave the service were not counted. To account for approved early releases from the Navy, one month for each contract year was the rule used for meeting the contract. For example, a recruit on a four-year contract whom the Navy allowed to leave four months before his or her four-year anniversary was not counted in the attrition total. These

individuals had to have one of the following SPD codes: JBK, JBM, JCC, KBJ, KBK, KBM, KCA, KCB, KCC, KCF, KGM, KGN, KGQ, KGX, KHC, LBK, LBM, LCC, MBI, MBK, MBM, MCA, MCB, MCC, MCF, MGP, MGQ, MGU, or MHC (BUPERSINST 1900.8, Enclosure 2).

Two assumptions were made for the analysis. The first is that all recruits have contracts of four years or longer. The contract lengths in the FY 93 cohort were computed and Table 6 shows that this assumption is reasonable.

Table 6. Contract Length for FY 93 Cohort

Mental Group	Contract Length in Years								N
	Unk	1	2	3	4	5	6	8	
Upper	8	81	117	41	35361	50	128	8111	43897
Lower	65	29	62	14	11784	12	13	4294	16273
FAST	0	8	10	4	2345	2	1	732	3102

Source: DSCAC FY 93 Cohort File

The 73 entries in the unknown (Unk) category either had a zero or a blank in the contract length category of the DSCAC file. Over 99 percent of all recruits have contracts of four years or longer. This assumption is only needed for the FY 93 total attrition calculations.

The second assumption is that all FAST students are from the lower mental group. Table 7 shows the mental group distribution of FAST students for FY 93 and 94.

Over 90 percent of all FAST recruits are in the lower mental group. This supports the selection of the lower mental group recruits as a control group for comparison.

Table 7. FAST Mental Group Distribution

Fiscal Year	Mental Group		N
	Lower	Upper	
1993	2826	276	3102
1994	1270	103	1373

Source: DSCAC FY 93 and FY 94 Cohort Files

A major advantage of this thesis was the access gained to the entire Navy recruiting population and the entire FAST population for FY 1993 and 1994. Consequently, the statistics derived from these populations are a sample of the entire Navy population.

The number of recruits separated from the service were counted at yearly intervals. Total attrition was computed as the mean number of recruits separated. These calculations were done in Lotus 1-2-3 Release 5 spreadsheets.

The means for each year are compared using hypothesis tests. Assuming a constant success probability, each recruit is considered an independent Bernoulli trial, with success defined as remaining in the Navy. The aggregated Bernoulli trials result in the Binomial data used in the analysis. Let x and y denote the number of successes observed in the two independent sets of n and m Bernoulli trials, and let $P_x = x/n$, $P_y = y/m$, and $A = (x + y)/(n + m)$. For large samples, $(P_x - P_y) / \text{SQRT} [\{(A) * (1 - A) * (n + m)\} / (n * m)]$ is approximately normally distributed with mean 0 and standard deviation 1. P-values are computed using this standard normal to determine the significance of the results. (Larsen, 1986, p. 380)

IV. DATA ANALYSIS

A. ATTRITION CALCULATIONS

A SPD was assigned when an enlisted sailor was discharged. The DSCAC files were searched for all personnel with a SPD. Those records have a date of enlistment and a date of discharge. The time served was computed by subtracting these two dates and comparing this difference to the contract length. Personnel whose time served was less than their contract and who met the definition for attrition were counted annually after separation until the end of the original contract. For example, a recruit with a three-year contract who was separated after eighteen months was only counted as an attrite at the two- and three-year marks.

The exception to the above rule occurred when the total attrition was calculated after the four-year mark in FY 93. Results using the assumption that all recruits had at least a four-year contract were used to determine the reenlistment rate for each of the three groups observed.

Table 8 shows the cumulative attrition at yearly intervals and the total attrition for FY 93. Table 9 shows the cumulative attrition at yearly intervals for FY 94. Total attrition was not included with FY 94 because most of the personnel had not completed four years of service.

To compare the groups, attrition was calculated for each year. The sample size for each successive year was smaller as prior separations were removed from analysis. Using year two of the FY 93 FAST data as an example, the total FAST students separated that

year was $952 - 594 = 358$. The sample size was $3102 - 594 = 2508$. The proportion separated that year was $358 / 2508 = 0.1427$. The attrition by FY is shown in Tables 10 and 11.

Table 8. FY 93 Cohort Cumulative Attrition

Mental Group	End of Year				Total Attrition	N
	One	Two	Three	Four		
Upper	8274	13172	18388	20725	26371	43897
Lower	4012	6111	8591	9401	11353	16273
FAST	594	952	1389	1552	1990	3102

Source: DSCAC FY 93 Cohort File

Table 9. FY 94 Cohort Cumulative Attrition

Mental Group	End of Year			N
	One	Two	Three	
Upper	6411	9547	13011	35598
Lower	3512	5071	7092	14932
FAST	213	325	488	1373

Source: DSCAC FY 94 Cohort File

Table 10. FY 93 Percent Attrition by Year

Mental Group	Year				Total Attrition
	One	Two	Three	Four	
Upper	18.85	13.75	16.98	09.16	60.07
Lower	24.65	17.12	24.40	10.54	69.77
FAST	19.15	14.27	20.33	09.52	64.15

Source: DSCAC FY 93 Cohort File

Table 11. FY 94 Percent Attrition by Year

Mental Group	Year		
	One	Two	Three
Upper	18.01	10.74	13.30
Lower	23.52	13.65	20.49
FAST	15.51	09.66	15.55

Source: DSCAC FY 94 Cohort File

A quick look at the 1993 data showed that FAST attrition was between the upper and lower mental groups and was closer to upper mental group attrition. FAST attrition was the lowest among the three groups for the first two years of 1994 before reverting to the 1993 trend in year three.

Three hypothesis tests were done on each year. They were "FAST percentage = Lower percentage," "FAST percentage = Upper percentage," and "Upper percentage = Lower percentage." The 95% level of significance was used for each test for each year. This level of significance does not refer to the set as a whole. P-values less than 0.0500 suggest that there is a significant difference between the attrition rates of the groups. Significant p-values for each FY are in bold and italicized in Tables 12 and 13.

B. DISCUSSION

First, it appears that FAST students generally attrite at a rate similar to the upper mental group throughout the first term. With the exception of year three in FY 93, FAST attrition is close to upper mental group attrition. Second, it also appears that FAST students attrite at a lower rate than a similar non-participatory cohort of recruits from the

Table 12. FY 93 P-values

Hypothesis Test	Year				Total Attrition
	One	Two	Three	Four	
FAST = Lower	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>	0.2065	<i>0.0000</i>
FAST = Upper	0.6796	0.4612	<i>0.0000</i>	0.6249	<i>0.0000</i>
Upper = Lower	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>

Source: DSCAC FY 93 Cohort File

Table 13. FY 94 P-values

Hypothesis Test	Year		
	One	Two	Three
FAST = Lower	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>
FAST = Upper	<i>0.0180</i>	0.2392	<i>0.0352</i>
Upper = Lower	<i>0.0000</i>	<i>0.0000</i>	<i>0.0000</i>

Source: DSCAC FY 94 Cohort File

lower mental group. With the exception of year four in FY 93, FAST attrition is consistently at least four percent lower than the lower mental group. Finally, the reenlistment for a second term among FAST students is about four percent lower than the upper mental group, but it is about five percent higher than the lower mental group.

The benefit to the lower attrition and higher retention is that it saves the Navy money. Using the apparent four percent reduction in attrition and using 1500 recruits as the average annual FAST population, then about 60 additional sailors remain on active duty each year because of FAST. Dividing the \$350,000 cost of running the program each year by those 60 sailors results in a cost of \$5833 per sailor. Since it costs about

\$6767 to recruit a sailor, the program, without looking at any additional cost data, appears to have paid for itself. Clearly, the benefits of this program outweigh the costs.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

FAST participants attrite from the Navy at a lower rate than a similar non-participatory cohort of recruits. The apparent reduction is around four percent per year.

FAST participants reenlist in the Navy at a higher rate than a similar non-participatory cohort of recruits. The apparent increase is about five percent.

As a result, FAST is effective in lowering attrition. This implies that all steps should be taken to fill the 2500 annual seats at FAST in order to obtain the maximum benefit from this program.

B. RECOMMENDATIONS FOR FURTHER RESEARCH

Further study should be conducted on additional year groups to verify the apparent reductions in first term attrition. Additionally, these current groups should be tracked to see how many sailors from FAST are promoted to E-7 and how many serve until retirement. Finally, other remedial programs at Great Lakes should be studied to determine their effectiveness at lowering attrition.

APPENDIX A. FAST HISTORY

During the Age of Sail, sailors learned the arts of seamanship by on-the-job training. Since most seamen were illiterate, these apprentices listened to verbal instructions to learn their trade. Once a skill was mastered, that sailor would teach it to the next recruit, and this process would continue throughout each sailor's career. (Angus, 1986, p. 4)

In the 1800's, the job description of the Navy Chaplain was to "...perform the duty of schoolmaster; and ... he shall instruct the midshipmen and volunteers in writing, arithmetic and navigation..." (Halter, Dec 79, p. 38) As a result, chaplains became the first teachers of reading and writing to sailors.

In 1904, the rating of apprentice seaman was established. This program was the precursor of today's recruit training. This program standardized the training of the sailors going to ships. These guidelines were written down in what we now call The Bluejackets' Manual. (Angus, 1986, pp. 4-5)

In 1925, studies found that illiterate sailors faced many problems in the Navy. For example, it sometimes took four times as long to train someone illiterate to do a job compared to someone who could read. Another example was that illiterates were a hazard to others because they could not read safety instructions. As a result, the Navy developed written tests to help reduce the number of illiterates entering the Navy. (Angus, 1986, pp. 5-6)

An alternative to these screening programs was to conduct remedial training during boot camp. The expansion of the armed services during war required the use of this alternative. During World War I, the United States Army formed Development Battalions that trained 230,000 men over six months. During World War II, the Navy adapted a Civilian Conservation Corps education program to help train the functionally illiterate. This program lasted between twelve and twenty weeks. A total of 35,000 men went through this program in World War II. This program re-appeared at the start of the Korean War under the name Recruit Preparatory Training, but the program ended in 1957. (Angus, 1986, pp. 5-6) The long-term performance of men assigned to these special training units is not known (Hoiberg, Sep 74, p. 100).

A study called Marginal Man and Military Service: A Review found that 320,838 recruits received literacy training from 1 June 1943 to the end of World War II. The definition of success was achieving the literacy skills equal to the fourth-grade level. A total of 254,272 men achieved this required standard. (Zierdt, Apr 76, p. 49)

During the 1950's, the Fort Leonard Wood project and the "Project 1000" studies observed performance after literacy training and after eight months of duty. The researchers observed no significant differences between the literacy graduates and the controls. (Hoiberg, Feb 75, p. 280)

In 1951, Hunt and Wittson conducted a study on the neuropsychiatric implications of illiteracy. They hypothesized that illiteracy frequently was related to neuropsychiatric difficulties. They compared the World War II short-term attrition rates and discharge reasons for illiterate personnel to those of the Navy as a whole. Reasons for

neuropsychiatric discharges included inaptitude and unsuitability. This discharge rate was four to five times higher for the illiterate sample. (Hoiberg, Oct 74, p. 533)

As part of the War on Poverty, the "Project 100,000" experiment began in 1966. The military became the employer of low aptitude, functionally illiterate adults to teach them basic skills so they could benefit society when they completed their enlistments. This project showed that a perception bias against low-aptitude recruits existed, and that low-aptitude recruits have higher attrition rates, lower promotion rates, and lower levels of performance. The project was deemed successful because 8.2 percent were still on active duty in 1983 and 68 percent of those who left the service used the G. I. Bill. (Angus, 1986, pp. 6-7)

The training recommendations from "Project 100,000" were based on the theory that one does not have to acquire a certain level of competency in basic skills before one can start learning a job. The theory is to integrate the technical training with the literacy training and to relate both to what the person already knows. The relationship between job requirements and course objectives and the application of specific military areas to learning situations showed the students the practical value of what they learned. Instead of remedial training focusing on "reading to learn," these results supported the idea of "reading to do." (Angus, 1986, p. 8)

In 1967, all RTC's established ART Divisions in response to "Project 100,000." Failures on the first academic test and the retest in week three of recruit training resulted in a referral to ART. Recruits entered the ART program if their RGL on the Gates-MacGinite test was between the second and fifth grade. (Hoiberg, Jul 75, p. 3) The

reading curriculum consisted of three weeks of reading instruction and two weeks of learning naval terms and procedures (Hoiberg, Sep 74, p. 1009). The goal of this program was to raise the RGL to at least the fifth-grade level and stimulate recruit interest in reading. The Bureau of Naval Personnel (BUPERS) designated this level to insure fleet safety. (Hoiberg, Jul 75, p. 2)

In 1973, changes at ART included a selection criteria change and a standardization of the Literacy Skills curriculum. All recruits received a reading test on their second day of training. Scores below the fifth grade, fifth month resulted in a recruit being referred to ART for screening. Instructors assigned "Individually Paced Instruction" programs to recruits with a RGL above the third grade. Those recruits with very limited abilities were assigned to a one-week phonics course. All students were then divided into either the below fourth-grade reading course or the above fourth-grade reading course. The topics covered during the three-week course were comprehension, grammar, and Navy vocabulary. The purpose was to improve reading and study skills so that all of the recruits could successfully complete the academic portion of the recruit training cycle. All instructors were enlisted personnel with college credits or degrees. (Hoiberg, Jul 75, pp. 4-5)

In 1976, the Navy recommended the adoption of the ninth-grade level as the minimum RGL to replace the traditional fifth-grade level. It was estimated that 25 percent of Navy recruits required remediation. (Biersner, Apr 76, pp. 5-6)

In 1977, the GAO published A Need to Address Illiteracy Problems in the Military Services. Their study found that poor readers had higher discharge rates, had more

difficulty in training, and performed worse at their jobs than better readers. They recommended that the services develop a policy to address illiteracy and choose a minimum required enlistment reading level. (Barnes, Oct 88, p. 5)

In 1978, the Secretary of the Navy (SECNAV) signed an instruction on remedial training in basic skills. The policy provided for on-duty remedial training to fill personnel requirements. (SECNAVINST 1510.3, 2 Jun 78) As a result, all RTC's implemented a standardized ART program. All recruits took the Gates-MacGinite Level D reading test (1978) during the first week of training. Recruits who scored below the 6.0 RGL took an alternate version of the same Level D test to confirm the result. ART enrollment resulted for all recruits who scored between the fourth and sixth RGL. The next test given to ART entrants was the Stanford Diagnostic Reading Test (SDRT), Brown Level to diagnose their individual weaknesses. Instructional modules, designed by Memphis State University for CNET, were assigned based on need. The Literacy Skills curriculum lasted between one and five weeks. The student teacher ratio was 12:1 and 2187 out of 2368 recruits successfully completed the program that year. After finishing this Literacy Skills course, these recruits and those who failed any academic test took a SS curriculum before resuming training. (Wisher, May 81, pp. 1-2)

During this period, civilian instructors were contracted to teach the Literacy Skills portion of ART. The Navy awarded this reimbursable contract to the College of Lake County for RTC, Great Lakes and to the San Diego Community College for RTC, San Diego. RTC, Orlando had instructors provided at no cost to the Navy by the Orange County Florida Public Schools Adult Education program. (Ethridge, May 90, p. 44)

In 1982, the VS curriculum, also developed by Memphis State University, was added to ART. Like the Literacy Skills curriculum, it had the purpose of enabling recruits to complete the academic portion of recruit training. Emphasis of the new program was on Navy vocabulary, grammatical structures, and language fluency. Failure of the ECL examination resulted in assignment to the VS course. Based on results of the Gates-MacGinite test, the recruit then entered either the Literacy Skills or the SS curriculum before returning to a regular company. (Bowman, Aug 82, pp. 3-5) This program was not instituted until 1985 at RTC, Great Lakes due to the small Hispanic population there (Ethridge, May 90, p. 16).

Later in 1982, OPNAVINST 1510.11 established the ninth-grade RGL as the minimum goal for all enlisted personnel. This was based on several findings. First, according to DOD-STD-1685, all Navy technical manuals were to be written at the ninth-grade level. Second, Military Specification: MIL-M-38784A, Amendment 6 specified that the overall RGL of technical publications should be no greater than one RGL above that of the intended audience. Finally, two studies of non-rated sailors found their average RGL to be 9.5 and the RGL of a representative reading sample to be 10.1. By raising the minimum RGL from the sixth to the ninth grade, ART met these requirements. (Hamel, Oct 82, p. 9)

In 1986, the initial assessment of reading ability was the SDRT and the Gates-MacGinite Level D pre-test. RTC Orlando used the Gates-MacGinite post-test, RTC Great Lakes used the ECL pre- and post-tests, and RTC San Diego used the ECL pre- and Gates-MacGinite post-test (Angus, 1986, p. 18). This difference between programs

was resolved by CNTTINST 1540.42 series. As fiscal budgets tightened in the late 80's, the Navy directed a study to develop a RGL conversion table using results from the ASVAB. The goal was to eliminate the cost of licensing fees from using the SDRT and Gates-MacGinite tests in the ART program. HumRRO conducted the study and generated the conversion table using the VE score. The VE score is the sum of the Word Knowledge (WK) and Paragraph Comprehension (PC) portions of the ASVAB. The VE score was shown to be the best anchor test for equating the ASVAB to six published reading ability tests. (Barnes, Oct 88, pp. ii and iii)

In 1989, a VE score of 42 or below resulted in mandatory screening into ART. Based on seat availability, the cutoff was allowed to be raised as high as 46. Screening for VS was standardized by requiring that the ECL test be used by all RTC's. These actions resulted in ending the use of the Gates-MacGinite and the SDRT. (Chief of Naval Technical Training (CNTT), 27 Oct 89)

Later that year, the civilian instructor contracts changed from reimbursable to fixed cost. San Diego Community College won the contract at Great Lakes, Orange County Community College won the contract at San Diego, and Webster Adult Community College won the contract at Orlando. (Webb, 9 Jun 97)

Also in 1989, the Chief of Naval Personnel, Vice Admiral Boorda, declared a moratorium on discharging failing recruits because CNET could not define the critical elements in the recruit training program for which a failure to master would result in the sailor failing in the fleet. The re-instatement of academic attrition required the establishment of critical objectives, proven measures of effectiveness, and a testing

program unbiased by race, gender or socio-economic status. (Fletcher, 10 Jun 97) A lack of language proficiency is the only academic attrition allowed. From October 1, 1995 to June 1, 1997, only five recruits were separated for this reason (Recruit Attrition Report).

In 1990, ART was renamed FAST. The new curriculum was developed by Penn State University. (CNTT, 17 Apr 90) Implementation began at the beginning of FY 1992. Literacy Skills was renamed Navy Reading Skills (NRS). New CDP numbers were assigned to assist in tracking the effectiveness of FAST. These numbers uniquely identified the course and the RTC. NRS was assigned numbers 601K-601M, VS 6623-6625, and SS 6626-6628. Unfortunately, all three courses came under the same Course Identification Number (CIN): A-950-0061. Class sizes were limited to 20 students. (CNTT, 6 Aug 91) Overall guidance for FAST was given in CNTTINST 1540.42E.

With the drawdown after the cold war, RTC San Diego and RTC Orlando closed. FAST San Diego was discontinued before the end of fiscal year 1993. FAST Orlando was discontinued on 1 July 1994 (CNTT, 5 Nov 93). CNTT became ComNavMidSouth on 10 June 1994 and then ComNavMidSouth was disestablished 30 September 1995. With the consolidation of all FAST activities at RTC Great Lakes, CNTT assigned the Course Curriculum Model Manager (CCMM) duties to FAST Great Lakes. (CNTT, 8 Apr 94)

With the downsizing of the military, the following instructions have all been canceled: SECNAVINST 1510.3, OPNAVINST 1510.11, and CNTTINST 1540.42E. The only remaining guidance for FAST is NAVCRUITRACOMGLAKESINST 1540.8B and NAVEDTRA 135 series. All three courses are in the process of having the instructor guides and lesson plans put into the CNET approved format of NAVEDTRA 135.

On March 21, 1997, the ECL was replaced as the VS screening test by the American Language Course Placement Test (ALCPT). The ALCPT is designed for United States citizens and legal residents while the ECL will be used for foreign officers. The Defense Language Institute English Language Center at Lackland Air Force Base, Texas directed this change. (Hagert, 27 May 97)

Data collection using a single FAST CIN for the three unique courses proved to be inadequate. As a result, NRS was assigned CIN A-950-0061 and CDP 601L, VS was assigned CIN A-950-0071 and CDP 301W, and SS was assigned CIN A-950-0072 and CDP 3023 on 1 May 1997. (CNET, 24 Feb 97)

Finally, the civilian contract changed again from fixed cost to "outsourcing." TESCO, a subsidiary of CACI, won the contract. Only one member of the civilian faculty left with the change, and that position has been filled. (Hagert, 9 Jan 98)

APPENDIX B. RAW PROMOTION DATA

Effectiveness is sometimes measured by promotion instead of retention. Although not specifically asked for by RTC, the raw promotion data for FY 1993 and 1994 is provided below.

For FY 93, the data is separated into the number of promotions. This was determined by subtracting the starting rank from either the current rank or the separation rank. This data is summarized in Table 14.

For FY 94, the data is given as either the current rank if the sailor is still in the Navy, or the discharge rank if the sailor was separated from the Navy. This data is summarized in Table 15.

Table 14. FY 93 Promotion Data

RTC	FAST Class	Pass/ Fail	Number of Promotions							Total E-5	N
			-2	-1	0	1	2	3	4		
Lower Mental Group			29	110	4782	2922	5072	3285	73	103	16273
GL	NRS	Pass	0	6	50	78	142	98	0	1	374
		Fail	1	0	65	5	4	1	0	0	76
	SS	Pass	2	5	132	113	182	123	1	1	558
		Fail	1	0	88	2	13	4	0	0	108
	VS	Pass	0	0	13	8	22	24	1	1	68
		Fail	0	0	6	0	2	1	0	0	9
OR	NRS	Pass	9	11	166	229	479	292	4	6	1190
		Fail	0	4	78	16	16	8	0	0	122
	SS	Pass	0	0	0	1	2	3	0	0	6
		Fail	0	0	0	0	0	0	0	0	0
	VS	Pass	0	0	0	3	6	3	0	0	12
		Fail	0	0	0	0	0	0	0	0	0
SD	NRS	Pass	1	2	90	71	155	136	5	5	460
		Fail	0	0	15	1	3	3	0	0	22
	SS	Pass	0	0	11	10	15	4	0	0	40
		Fail	0	0	0	0	0	0	0	0	0
	VS	Pass	0	0	7	8	11	27	0	0	53
		Fail	0	0	3	1	0	0	0	0	4

Source: DSCAC FY 93 Cohort File

Table 15. FY 94 Promotion Data

RTC	FAST Class	Pass/ Fail	Rank					N
			E-1	E-2	E-3	E-4	E-5	
Lower Mental Group			3726	2156	7642	1388	20	14932
GL	NRS	Pass	68	67	339	76	2	552
		Fail	36	5	5	1	0	47
	SS	Pass	5	4	11	1	0	21
		Fail	1	0	3	0	0	4
	VS	Pass	3	5	96	32	0	136
		Fail	3	1	4	1	0	9
OR	NRS	Pass	58	56	280	67	0	461
		Fail	35	21	71	9	0	136
	SS	Pass	0	0	0	0	0	0
		Fail	0	0	0	0	0	0
	VS	Pass	0	1	6	0	0	7
		Fail	0	0	0	0	0	0

Source: DSCAC FY 94 Cohort File

APPENDIX C. RAW DATA TABLES

This appendix will have the raw data tables used in the data analysis section broken down to the lowest levels. Three tables will be shown for FY 93, and two for FY 94.

Table 16 shows FY 93 attrition, Table 17 shows FY 93 contract length, and Table 18 shows FY 93 AFQT mental groups.

Table 19 shows FY 94 attrition and Table 20 shows FY 94 AFQT mental groups.

Table 16. FY 93 Attrition Data

RTC	FAST Class	Pass/ Fail	End of Year				Total Attrition	N
			One	Two	Three	Four		
Upper Mental Group			8274	13172	18388	20725	26371	43897
Lower Mental Group			4012	6111	8591	9401	11353	16273
GL	NRS	Pass	34	91	153	175	228	374
		Fail	56	56	70	72	73	76
	SS	Pass	105	180	270	302	367	558
		Fail	86	90	95	96	100	108
	VS	Pass	10	19	26	27	34	68
		Fail	6	6	6	6	6	9
OR	NRS	Pass	113	262	445	519	706	1190
		Fail	85	91	97	99	107	122
	SS	Pass	0	1	1	1	1	6
		Fail	0	0	0	0	0	0
	VS	Pass	0	1	3	4	7	12
		Fail	0	0	0	0	0	0
SD	NRS	Pass	71	116	166	191	287	460
		Fail	14	16	17	17	19	22
	SS	Pass	6	12	23	25	33	40
		Fail	0	0	0	0	0	0
	VS	Pass	5	8	13	14	18	53
		Fail	3	3	4	4	4	4

Source: DSCAC FY 93 Cohort File

Table 17. FY 93 Contract Data

RTC	FAST Class	Pass/ Fail	Contract Length in Years								N
			Unk	1	2	3	4	5	6	8	
Upper Mental Group			8	81	117	41	35361	50	128	8111	43897
Lower Mental Group			65	29	62	14	11785	12	13	4294	16273
GL	NRS	Pass	0	1	4	2	268	0	0	99	374
		Fail	0	0	0	0	53	0	0	23	76
	SS	Pass	0	0	4	1	425	0	1	127	558
		Fail	0	1	1	1	72	0	0	33	108
	VS	Pass	0	0	0	0	52	0	0	16	68
		Fail	0	0	0	0	8	0	0	1	9
OR	NRS	Pass	0	4	1	0	896	2	0	287	1190
		Fail	0	0	0	0	84	0	0	38	122
	SS	Pass	0	0	0	0	5	0	0	1	6
		Fail	0	0	0	0	0	0	0	0	0
	VS	Pass	0	0	0	0	9	0	0	3	12
		Fail	0	0	0	0	0	0	0	0	0
SD	NRS	Pass	0	1	0	0	381	0	0	78	460
		Fail	0	0	0	0	20	0	0	2	22
	SS	Pass	0	0	0	0	32	0	0	8	40
		Fail	0	0	0	0	0	0	0	0	0
	VS	Pass	0	1	0	0	36	0	0	16	53
		Fail	0	0	0	0	4	0	0	0	4

Source: DSCAC FY 93 Cohort File

Table 18. FY 93 Mental Group Data

RTC	FAST Class	Pass/ Fail	AFQT Mental Group								N
			Unk	V	IVC	IVB	IVA	IIIL	IIIU	II	
Lower Mental Group			202	0	1	1	10	16059	0	0	16273
GL	NRS	Pass	0	0	0	0	1	358	15	0	374
		Fail	0	0	0	0	0	74	2	0	76
	SS	Pass	0	0	0	0	0	488	56	14	558
		Fail	0	0	0	0	0	87	18	3	108
	VS	Pass	0	0	0	0	0	64	4	0	68
		Fail	0	0	0	0	0	8	1	0	9
OR	NRS	Pass	0	0	0	0	3	1076	104	7	1190
		Fail	0	0	0	0	0	98	15	9	122
	SS	Pass	0	0	0	0	0	6	0	0	6
		Fail	0	0	0	0	0	0	0	0	0
	VS	Pass	0	0	0	0	0	12	0	0	12
		Fail	0	0	0	0	0	0	0	0	0
	NRS	Pass	0	0	0	0	1	442	17	0	460
		Fail	0	0	0	0	0	20	2	0	22
SD	SS	Pass	0	0	0	0	0	37	3	0	40
		Fail	0	0	0	0	0	0	0	0	0
	VS	Pass	0	0	0	0	1	48	4	0	53
		Fail	0	0	0	0	0	2	1	1	4

Source: DSCAC FY 93 Cohort File

Table 19. FY 94 Attrition Data

RTC	FAST Class	Pass/ Fail	End of Year			N
			One	Two	Three	
Upper Mental Group			6411	9547	13011	35598
Lower Mental Group			3512	5071	7092	14932
GL	NRS	Pass	59	109	178	552
		Fail	41	41	44	47
	SS	Pass	3	8	12	21
		Fail	3	3	3	4
	VS	Pass	5	12	22	24
		Fail	8	8	8	9
OR	NRS	Pass	46	88	148	461
		Fail	48	56	71	136
	SS	Pass	0	0	0	0
		Fail	0	0	0	0
	VS	Pass	0	0	2	7
		Fail	0	0	0	0

Source: DSCAC FY 94 Cohort File

Table 20. FY 94 Mental Group Data

RTC	FAST Class	Pass/ Fail	AFQT Mental Group								N
			Unk	V	IVC	IVB	IVA	IIIL	IIIU	II	
Lower Mental Group			135	9	10	45	633	14100	0	0	14932
GL	NRS	Pass	0	0	0	3	22	496	30	1	552
		Fail	0	0	0	0	5	40	2	0	47
	SS	Pass	0	0	0	1	2	14	3	1	21
		Fail	0	0	0	0	0	3	0	1	4
	VS	Pass	0	0	0	0	11	110	13	2	136
		Fail	0	0	0	0	1	7	1	0	9
OR	NRS	Pass	0	1	0	3	19	402	30	6	461
		Fail	0	0	0	0	11	112	12	1	136
	SS	Pass	0	0	0	0	0	0	0	0	0
		Fail	0	0	0	0	0	0	0	0	0
	VS	Pass	0	0	0	0	0	7	0	0	7
		Fail	0	0	0	0	0	0	0	0	0

Source: DSCAC FY 94 Cohort File

LIST OF REFERENCES

- Angus, Marlene A. Native Language Ability and Trainability in English. Research Study, San Diego State University, San Diego, California, Fall, 1986.
- Barnes, Jeffrey D., Brown, Dianne C., Foley, Paul, Steinhaus, Stephen D., and Waters, Brian K. Estimating the Reading Skills of Military Applicants: Development of an ASVAB to RGL Conversion Table. HumRRO FR-PRD-88-22, Human Resources Research Organization, Alexandria, Virginia, October 1988.
- Belanger, Michael D. An Evaluation of a Basic Skills Training Program. Master's Thesis, Loyola University, Chicago, Illinois, December 1994.
- Biersner, Robert J. Measurement of Reading Proficiency among Navy Recruits. CNETS-1-76, Chief of Naval Education and Training Support, Pensacola, Florida, April 1976.
- Biersner, Robert J. and LaRocco, James M. Determinates of Reading Performance and Achievement. Report Number 79-42, Naval Health Research Center, San Diego, California, February 1980.
- Bowman, Harry L., Jones, Paul L., Kaiser, Robert A., and Thompson, Janet. Navy Verbal Skills Curriculum Guide. Supplement to Technical Report 128, Training Analysis and Evaluation Group, Orlando, Florida, August 1982.
- Brown, Cheryl J. Assessment of the Need for Verbal Language Instruction for Navy Recruits. TAEG Technical Memorandum 82-3, Training Analysis and Evaluation Group, Orlando, Florida, March 1982.
- BUPERSINST 1900.8, 28 June 1993.
- CNETINST 1510.1F, 15 April 1997.
- CNET Letter. Serial T24211/0112. 24 February 1997.
- CNTTINST 1540.42E, 30 October 1991.
- CNTT Letter. Serial N6213/11319. 27 October 1989.
- CNTT Letter. Serial N6213/3974. 17 April 1990.
- CNTT Letter. Serial N6213/7864. 6 August 1991.

CNTT Letter. Serial N621/9444. 5 November 1993.

CNTT Letter. Serial N621/3012. 8 April 1994.

COMNAVCRUITCOMINST 1130.8D.

COMNAVCRUITCOMNOTE 1133. 23 September 1989.

CO, RTC San Diego Report. Serial 2400/5118. 30 January 1990.

Ethridge, Anita and Thompson, Janet R. Evaluation of Navy Academic Remedial Training. Technical Report 89-W1057, Naval Training Systems Center, Orlando, Florida, May 1990.

FAST ASMO-In Statistics. Fiscal Year 93. FAST Division files, Great Lakes.

FAST Facts. Fiscal Year 94. FAST Division files, Great Lakes.

FAST Monthly Tracking Sheets. FAST Division files, Great Lakes. October 1992 - September 1994.

Fletcher, LCDR. Director of Training, RTC Great Lakes. Interview on 10 June 1997.

FY93 FAST Input by Path. FAST Division files, Great Lakes.

General Accounting Office. Military Attrition: DOD Could Save Millions by Better Screening Enlisted Personnel. Washington, D.C., January 1997.

Golfin, Peggy A. and Koopman, Martha E. Analysis of Functional Applied Skills Training (FAST) Program. CAB 95-22, Center for Naval Analyses, Alexandria, Virginia, March 1995.

Golfin, Peggy A. and MacIlvaine, Martha E. Mid-Career Enlisted Promotion: Effect of Service and Personal Characteristics. CRM 95-120, Center for Naval Analyses, Alexandria, Virginia, August, 1995.

Hagert, CTIC. FAST Division Officer. Interview on 27 May 1997.

Hagert, CTIC. FAST Division Officer. Phone conversation on 9 January 1998.

Halter, Stanley F. An Examination of the Quality of Current and Future Military Enlisted Personnel. Master's Thesis, Naval Postgraduate School, Monterey, California, December 1979.

Hamel, Cheryl J. and Aagard, James A. Readability Levels of Representative Navy Job Reading Materials for Nonrated Personnel. TAEG Technical Memorandum 82-5, Training Analysis and Evaluation Group, Orlando, Florida, October 1982.

Hamilton, Robert E. Overview: MEPAC.CHTEN.F* Files (DSCAC) (The DMDC Enlisted Career-Tracking Files). 24 January 1995.

Hoiberg, Anne, Hysham, C. J., and Berry, N. H. Prediction of Graduation from Academic Remedial Training. Report Number 73-46, Naval Health Research Center, San Diego, California, July 1973.

Hoiberg, A., Hysham, C. J., Berry, N. H., and Foster, Michael. Characteristics of Naval Recruits Related to Reading Improvement. Report Number 73-60, Naval Health Research Center, San Diego, California, August 1973.

Hoiberg, Anne, Hysham, C. J., and Berry, Newell H. "Effectiveness of Recruits Assigned to Academic Remedial Training." Report 74-37, Navy Medical Neuropsychiatric Research Unit, San Diego, California. Psychological Reports, 35, pages 1007-1014, September 1974.

Hoiberg, A. L., Hysham, C. J., and Berry, N. H. "The Neuropsychiatric Implications of Illiteracy: 20 Years Later." Report Number 74-20, Navy Medical Neuropsychiatric Research Unit, San Diego, California. Journal of Clinical Psychology, Volume 30, Number 4, pages 533-535, October 1974.

Hoiberg, Anne. "The Role of Remedial Training in the Naval Service: One Last Chance for Many Recruits." Report Number 75-17, Naval Health Research Center, San Diego, California, February 1975. Proceedings: Research Conference on the Social Psychology of Military Service, pages 274-289, 23-25 April 1975.

Hoiberg, Anne. To Read or Not to Read. Report Number 75-55, Naval Health Research Center, San Diego, California, July 1975.

Instructor Management Plan for Fundamental Applied Skills Training (FAST) Navy Reading Preparatory School. CNTT, Millington, Tennessee, August 1991.

Larsen, Richard J. and Marx, Morris L. An Introduction to Mathematical Statistics and its Applications. Prentice Hall, Englewood Cliff, New Jersey, 1986.

NAVCRUITCOMGLAKESINST 1540.8B, 2 Dec 1992.

Navy Contract N00612-94-R-9011/Amendment 0005. 15 September 1993.

Navy Contract N00612-95-C-09011. 1 April 1995.

Navy Recruiting Command Policy-Gram #60-90/District 18-90. Serial 20t/0517. 5 March 1990.

Navy Times. "Junior sailor shortage." 27 October 1997.

Navy Times. "No relief in sight as services squeak by on recruiting goals." 1 December 1997.

Navy Times. "Persuading sailors not to abandon Navy career." 15 December 1997.

Navy Times. "We've got to catch up." 17 November 1997.

Navy Training Requirements Review "Recruit", Sequence Number 2136, 26 February 1996.

Navy Training Requirements Review "Recruit", Sequence Number 2136, 14 June 1996.

NITRAS II Multi Class Student Data Reports. CDP's 6623, 6624, 6625, 6626, 6627, 6628, 601K, 601L and 601M. Fiscal Year 1993.

NITRAS II Multi Class Student Data Reports. CDP's 6624, 6625, 6627, 601L and 601M. Fiscal Year 1994.

OPNAVINST 1500.69A, 10 October 1995.

OPNAVINST 1510.11, 19 August 1982.

OPNAVINST 1514.1B, 25 February 1994.

Powers, Thomas E. Selecting Presentation Modes According to Personnel Characteristics and the Nature of Job Tasks. Part II: Personnel Characteristics. Volume I, Summary and Analysis, University of Maryland, Baltimore County, Maryland, July 1977.

Recruit Attrition Report, Great Lakes, Illinois, Fiscal Years 1995-97.

Recruit Training Command, Great Lakes Command Philosophy Statement, July 1996.

Recruit Training Command, Great Lakes Mission Statement, 1996.

Recruit Training Command, Great Lakes Vision Statement, 1996.

RTCINST 1510.3R, 17 March 1997.

RTCINST 1616.3L, 12 March 1997.

Sander, Stephen I. and Duffy, Thomas M. Reading Skills, Reading Requirements, Learning Strategies, and Performance in Navy Technical Schools. NPRDC Technical Report 82-55, Navy Personnel Research and Development Center, San Diego, California, August 1982.

SECNAVINST 1510.3, 2 June 1978.

Spendley, John K., Effectiveness of the U.S. Navy's Basic Skills Enhancement Program Entitled Functional Applied Skills Training (FAST), Master's Thesis, Naval Postgraduate School, Monterey, California, December 1990.

Testing Plan for Fundamental Applied Skills Training. CNTT, Millington, Tennessee, August 1991.

Thomlison, Cynthia Ann. Fundamental Applied Skills Training (FAST) Program Measures of Effectiveness. Master's Thesis, Naval Postgraduate School, Monterey, California, March 1996.

Webb, Emily. CNET T24211. Phone conversation on 9 June 1997.

Wisher, Robert A. Computer-Assisted Literacy Instruction in Phonics. NPRDC Technical Report 80-21, Navy Personnel Research and Development Center, San Diego, California, April 1980.

Wisher, Robert A. and O'Hara, John W. Computer-Based Approach to the Navy's Academic Remedial Training, Project PREST: A Cost-Effectiveness Evaluation. NPRDC Special Report 81-18, Navy Personnel Research and Development Center, San Diego, California, May 1981.

Zierdt, Lucy Elizabeth, Remedial Reading Programs for Personnel Entering the United States Navy. Professional Study, Air War College, Maxwell Air Force Base, Alabama, April 1976.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center..... 2
 8725 John J. Kingman Rd., STE 0944
 Fort Belvoir, VA 22060-6218

2. Dudley Knox Library..... 2
 Naval Postgraduate School
 411 Dyer Rd.
 Monterey, CA 93943-5101

3. Navy Manpower Analysis Center..... 1
 Code 531
 NAS Memphis
 5820 Navy Rd.
 Millington, TN 38054-5066

4. Chief of Naval Education and Training..... 1
 CNET 00
 250 Dallas St.
 Pensacola, FL 32508-5220

5. Ms. Emily Webb..... 1
 CNET Code T24211
 250 Dallas St.
 Pensacola, FL 32508-5220

6. Commander..... 3
 ATTN: Training Code T01
 Naval Training Center Great Lakes
 2701 Sheridan Rd.
 Great Lakes, IL 60088-5001

7. Commander..... 1
 ATTN: Training Code T13
 Naval Training Center Great Lakes
 2701 Sheridan Rd.
 Great Lakes, IL 60088-5001

8. **Commanding Officer 1**
 Building 1127 Mailroom
 2704 Sheridan Rd.
 Recruit Training Command
 Great Lakes, IL 60031
9. **CISO 1**
 Building 1127 Mailroom
 2704 Sheridan Rd.
 Recruit Training Command
 Great Lakes, IL 60088
10. **CTIC Hagert. 1**
 FAST LCPO
 Building 1127 Mailroom
 2704 Sheridan Rd.
 Recruit Training Command
 Great Lakes, IL 60088
11. **Ms. June Ross. 1**
 FAST Associate Dean
 Building 1127 Mailroom
 2704 Sheridan Rd.
 Recruit Training Command
 Great Lakes, IL 60088
12. **Professor Samuel E. Buttrey. 1**
 Naval Postgraduate School
 Monterey, CA 93943-5103
13. **Professor Robert R. Read. 1**
 Naval Postgraduate School
 Monterey, CA 93943-5103
14. **LT Jeffrey Hickox. 1**
 124 Marie Drive
 Pittsburgh, PA 15237